Find the Quadratic!

We have spent quite a while solving quadratics – now let's see if we can find the equation of a quadratic, from some initial starting information

Example 1:

Find the quadratic equation whose roots are -3 and 7

This involves us working backwards – starting at the solution, and then going back to what the factors must have been etc:

if $x = -3$ or $x = 7$

$\Rightarrow (x + 3) = 0$ or $(x - 7) = 0$

$\Rightarrow (x + 3)(x - 7) = 0$

$\Rightarrow x^2 + 3x - 7x - 21 = 0$

$\Rightarrow x^2 - 4x - 21 = 0$

Example 2:

Find the quadratic equation whose roots are ½ and -5

This is solved in a very similar way:

if $x = \frac{1}{2}$ or $x = -5$

$$\Rightarrow (2x - 1) = 0 \quad \text{or} \quad (x + 5) = 0$$

$$\Rightarrow (2x - 1)(x + 5) = 0$$

$$\Rightarrow 2x^2 - x + 10x - 5 = 0$$

$$\Rightarrow 2x^2 + 9x - 5 = 0$$

Example 3:

Find the quadratic equation which passes through the points A(1, 5), B(-2, 17) and C (0, 7)

There are many ways to solve this – here's an algebraic way:

We know $y = ax^2 + bx + c$ is the general form of a quadratic

Let's substitute in the coordinates of A, B and C …

A (1, 5) $\Rightarrow \quad 5 = a + b + c$

B (-2, 17) $\Rightarrow \quad 17 = 4a - 2b + c$

C (0, 7) $\Rightarrow \quad 7 = c$

substituting c = 7 into the first two equations gives:

$a + b = -2$ and $4a - 2b = 10$

which can easily be solved simultaneously to give a = 1, b = -3 :

Thus our answer is $y = x^2 - 3x + 7$

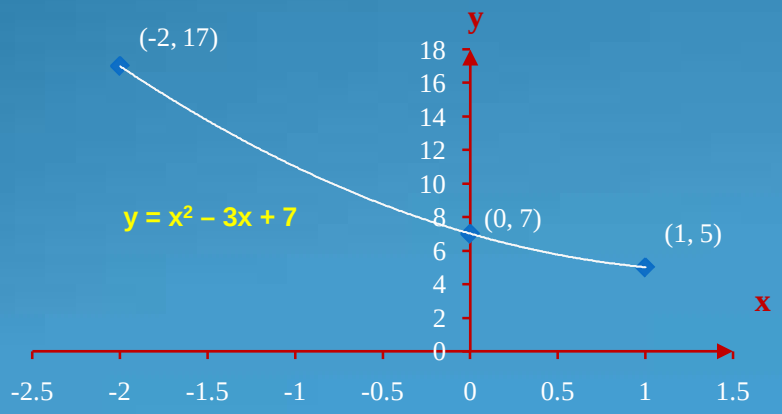
Let's do that last question again, using technology:

Find the quadratic equation which passes through the points A(1, 5), B(-2, 17) and C (0, 7)

Step 1: enter the coordinates into an excel spreadsheet

x	y
1	5
-2	17
0	7

Step 2: From the INSERT menu, choose the "scatter diagram" option and create the graph



Step 3: From CHART TOOLS, select "TRENDLINE" from the LAYOUT tab

Step 4: From MORE TRENDLINE OPTIONS, select POLYNOMIAL (order 2) and tick the box marked "show equation on chart"

The equation $y = x^2 - 3x + 7$ is displayed